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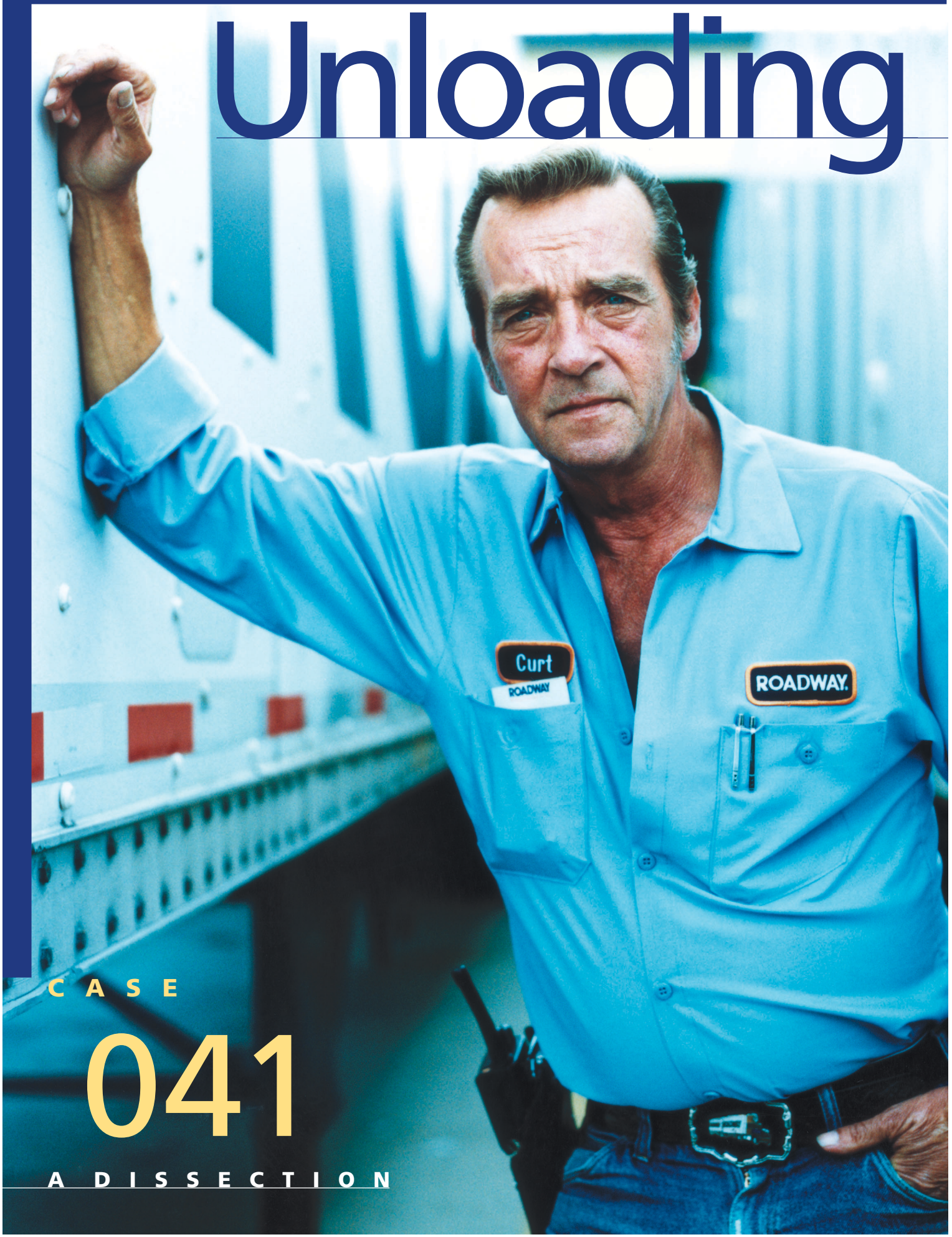

CASE

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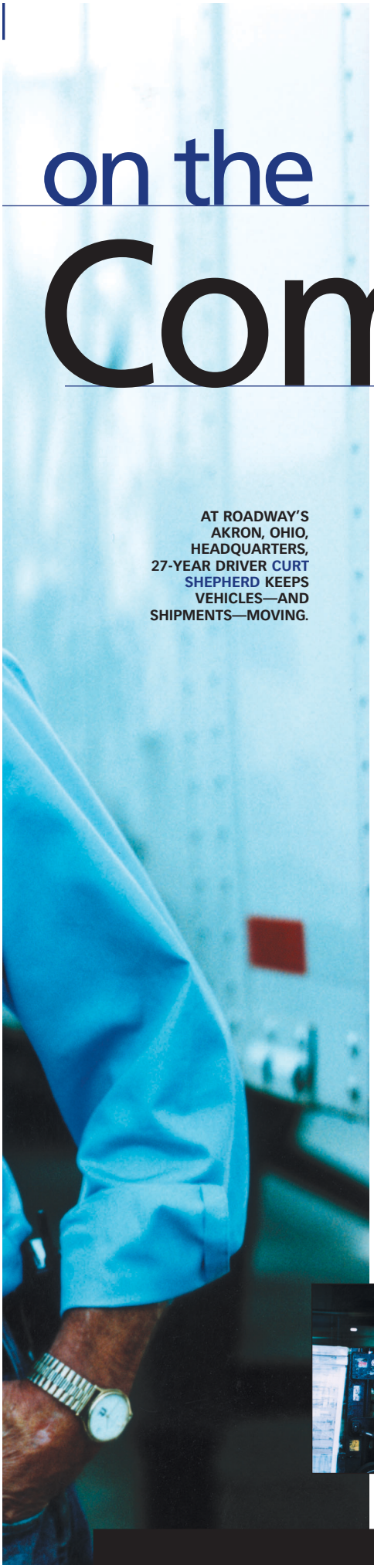
A DISSECTION

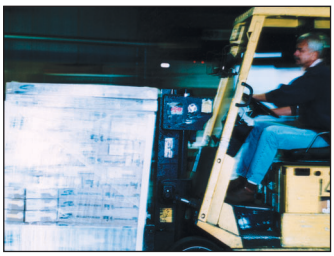
on the Competition



AT ROADWAY'S AKRON, OHIO, HEADQUARTERS, 27-YEAR DRIVER CURT SHEPHERD KEEPS VEHICLES—AND SHIPMENTS—MOVING.

In the past 22 years, two out of every three companies that carried less-than-full loads of freight across the country on trailers have disappeared. Consolidated Freightways in September was only the latest to succumb. The survivors? Those companies that track costs closely, down to every activity that matters on the loading dock and on the truck ... and shy away from unprofitable loads. Here's how **Roadway Express** does it, and why Roadway, too, needs to improve.

BY EDWARD CONE AND DAVID F. CARR



PHOTOGRAPHS BY PAUL ELLEDGE

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ROADWAY CORPORATION BASE CASE

Headquarters: 1077 Gorge Blvd., Akron, OH 44309-0471

Phone: (330) 384-1717

Business: Less-than-truckload freight hauling in North America makes up 87% of revenues; the rest comes from recently acquired regional trucking companies

Chief Information Officer: Robert W. Obee

2001 Financials: Revenue, $2.79 billion; net income, $30.8 million; revenue per ton, $374.37

Challenges: Win market share in a consolidating industry; increase understanding of costs; improve pricing; identify and focus on profitable customers

BASELINE GOALS:

- Raise operating margins from 2.1% in 2001 to exceed 1997 baseline of 2.3%
- Increase revenue per ton from $374.37 in 2001 and 1997 baseline of $323.62
- Reduce claims paid for lost or damaged shipments by tens of millions of dollars a year
- Reduce fixed costs to less than 25% of total costs

John Majorkiewicz works fast, snugging packages into place in the back of a truck, using cargo pillows he inflates with a fat air hose. The tall, wiry dock worker, more commonly known as "John Major," is working to make sure a trailer bound for Valdosta, Ga., will go out full. He prides himself on "packing them high and tight."

The scene, pieced together from interviews, is a typical night at the Roadway Express distribution center in Copley, Ohio. Major is one of more than 200 employees who break apart and sort shipments from many customers and many local terminals, then load the rearranged goods onto outbound trailers.

As Major finishes loading each shipment, he turns to a wall-mounted terminal on a post by the dock door. He swipes a bar-code wand across the waybill, a document that shows the contents and destination of the shipment. He drags the wand across the cover of the terminal itself and across his own ID badge, then presses a couple of keys. All this adds up to a record of "five skids loaded by forklift, Door 135, 2:58 a.m." Years ago, he would have scrawled these details on the waybill itself.

Looking to fill the trailer, Major finds several shipments bound for Orlando, Fla., one of the satellite terminals serviced by Valdosta. But when he scans the waybill he gets a beep loud enough to be heard over the rumble of the forklifts and the bustle of this "breakbulk" facility operating at full tilt. The tiny screen reads: "WARNING: MISLOAD STACK."

All night he's been loading shipments for Orlando at Door 135, but now the computer tells him that freight for Orlando is being loaded from Door 98. A dock manager has reassigned doors because a customer has paid extra to expedite a delivery to Orlando.

To meet a guarantee of delivery within two days, Roadway needs to send the trailer containing those shipments on its way by 4 a.m., even though right now it's only three-quarters full. But to maximize margins, Roadway wants to pack in as much other Orlando-bound freight as possible for what amounts to a free ride; the trucker also saves the expense of handling those packages at Valdosta. Once the special-order trailer is full, Major will be able to load the remaining Orlando-bound freight onto the Valdosta trailer without any rude beeps.

Major has a simple answer for how Roadway's information systems have changed his job. "It means I don't have to get my pencil out so much anymore," he says, producing one from behind his ear.

By repeatedly tracking the labor required for him to handle shipments for one customer versus another, Roadway's systems do a lot more for the company, headquartered just down the interstate in Akron. Through a practice called activity-based costing (ABC), Roadway has committed itself to analyzing everything from the size, number and content of shipments, to each step in moving a pallet of toasters from factory, to truck, to retailer, and the time each step takes.

What Roadway gets is an electronic extension of the kind of time-motion efficiency study espoused by "scientific management" pioneer Frederick Taylor a century ago: a clear, statistically based view of every activity serving a customer that is performed by Roadway workers. And with the backing of a huge warehouse of this data, Roadway can put a number on how much each activity costs and how effective the result is for each customer. This clear understanding of its own business helps Roadway reduce fixed costs, identify profitable customers and price its services to maximize operating margins.

"We see this as a source of competitive advantage," says Chief Information Officer Robert W. Obee. "We know the difference in profitability between different services, so we know how to grow our profitability. That can lead us to move away from, or not emphasize, certain types of business. It's

THE ROADWAY PLAYER ROSTER

Michael W. Wickham
Chairman and Chief Executive Officer, Roadway Corp.

Thirty-four years after joining Roadway Express out of college, Wickham has worked everywhere from the freight terminals to the executive suite. He became CEO of Roadway upon its spin-off as a public company in 1996, the year before it began its data warehouse project. Last year he acquired a pair of regional carriers in keeping with Roadway's new growth strategy.

Robert W. Obee
Chief Information Officer, Roadway Express

Bob Obee is the point man for making technology meet business strategy in everyday usage. A 19-year Roadway veteran with a doctorate in business administration and a background in operations planning and engineering, Obee has maintained Roadway's build-it-yourself culture since taking the head technology post in 1993.

Dawson Cunningham
Executive Vice President and Chief Financial Officer, Roadway Corp.

Another longtimer, Cunningham joined Roadway Express in 1985 and became CFO in 1998. Then, he assumed that title at the holding company when it was formed in 2001. Using technology to create a strategic understanding of cost makes him a key supporter and beneficiary of Roadway's tech strategy.

David M. Pavlich
Director of Applications Development and E-commerce, Roadway Express

Pavlich is responsible for translating the tech vision into the actual material used by the workers, managers and customers of Roadway Express. With nine years on the job in Akron, he provides continuity to the earliest days of the company's data warehouse.

James R. Rowe
Assistant Vice President of Operations Planning and Engineering, Roadway Express

Rowe works with Obee's people to provide a precise understanding of how Roadway actually gets its work done, and how it might be able to change its processes.

William McGinley
Director, Pricing Systems, Roadway Express

Getting reliable cost information to the managers who set Roadway's prices is a critical part of McGinley's job.

OUTSIDERS

Norman L. Ellis
Vice President of Business Operations, Qualcomm

Ellis, who has a background in trucking and logistics, helped the company succeed in customizing its shipping applications to wireless devices, an area where Roadway had failed several years earlier.

James Damon
Senior Systems Engineer, Computer Corporation of America

Tweaks the powerful Model 204 mainframe system used for Roadway's transaction processing; helps assess the impact of potential changes on system performance.

also very effective at a low-level, tactical, customer-by-customer basis. Every time we go to the negotiating table, we just pull that business apart."

Roadway, for instance, may define one activity as "move shipment across dock" at a breakbulk facility. That movement for one shoe manufacturer's regular shipment may prove to cost $100 a load. But the activity involved in another manufacturer's same-size shipment may work out to just $80, because the shipment is better labeled and arranged when it arrives. With this kind of precision, Roadway knows what it has to charge each to recoup costs fairly.

Such attention to detail is critical in Roadway's chosen field of freight: the less-than-truckload segment where profits amount to fewer than three cents on the dollar and underperforming companies can become roadkill. Last month, $2.2-billion-a-year Consolidated Freightways, the third-largest, less-than-truckload hauler behind Roadway and Yellow Corp., announced it would discontinue operations.

"Consolidated made decisions in the marketplace that indicated they didn't understand their costs well," says Dawson Cunningham, chief financial officer of Roadway Corp. "They were not pricing their service offerings based on the costs we would have expected to incur."

And Consolidated was only the latest partial-load competitor to fail. Two-thirds of the largest such haulers who were in business prior to the deregulation of the industry in 1980 have since gone bust, according to industry journal *Transport Topics*. Casualties included PIE Nationwide and McLean Trucking, which were right behind Roadway, Consolidated and Yellow in 1979 revenues.

Yet some companies have thrived, and the difference is partly due to the intelligent use of technology to understand costs and set prices.

DISTINGUISHING DIFFERENCE

Information technology "is the distinguishing difference in this industry, determining what you can do and can't do," says Cunningham. A strong "technology base is as important—or more important—than the ability to just move the freight."

Arkansas Best Corp., for example, got started decades ago on its own cost-analysis systems. Now, it boasts the best margins in the industry, recording net profits of seven cents on the dollar last year. Meanwhile the market leader in terms of revenue, Yellow, is on the fourth generation of its costing tools.

Roadway needs to do some catching up, at least to Arkansas Best. In 2001, Roadway Corp., the parent company of Roadway Express, had $2.8 billion in revenue. Roadway Express, which accounted for 87% of that revenue, had net margins of 1.2%, less than half the 2.5% industry average. Operating expenses edged up to 97.9% of sales in 2001, from 96.8% in 2000. By comparison, the industry average is 94.5%. And Arkansas Best's ABF Freight unit last year came in at 93.7%.

But even though affected by the economic slowdown, Roadway is getting results from its cost-identification effort. Largely because of it, Roadway Express can make more money shipping fewer goods, if it so chooses.

For instance, Roadway Express shipped 12.6% less freight last year than it did in 2000—a decline of more than one million tons to 7.2 million. That is a level last seen in 1987.

But a third of that drop-off happened by design, says Cunningham. "One-third of the decline we chose, because we didn't desire to do that business," he says. "We knew what it would cost us, and in a competitive pricing environment it didn't make sense for us."

Better understanding its costs has helped Roadway shift its ratio of fixed cost to variable costs, so that today only

20% of costs are fixed, down from 25% five years ago.

"Roadway is doing as good a job—if not better—than anyone else on the pricing front," says Dan Moore, a securities analyst at Stephens Inc. in Little Rock, Ark. "They have done a superb job of managing through the economic downturn, while in previous downturns they have not."

One of the biggest reasons is the use of activity-based costing, supported by a data warehouse and business intelligence tools. The project started in 1997, after Roadway Express was spun off from holding company Roadway Services. The motivation was tight operating margins and the need for a system of tying actions to costs that both a sales force and terminal managers could understand and trust.

"Today we have real-time access to the information we need," says Cunningham. "The system has contributed to maintaining margins."

Activity-based costing has existed as a discipline since the 1980s. But it has attracted interest recently as a component of efforts both to manage relationships with customers as well as to measure performance. The idea is that you can't determine what it really costs to produce a particular product or serve a particular customer by looking only at the numbers generated for standard financial reports issued by a company as a whole, or even at the more detailed internal reports organized by department. For a company such as Roadway, the key is not to assign costs to the company or a department, but to a package and a particular customer.

YOU CAN'T DETERMINE WHAT IT COSTS TO SERVE A PARTICULAR CUSTOMER BY LOOKING ONLY AT THE NUMBERS.

"Costing information at the facility level was good for identifying and managing costs, but we needed a better handle on assigning those costs to individual freight transactions," says Cunningham.

This activity-based costing analysis traces activities across departmental boundaries in search of the total cost per product or per customer.

This includes interviewing workers to get a foreman's-eye view of what they actually do. Then, information systems can crunch the data obtained by observing operations closely, such as how much time it takes to load scattered boxes from one manufacturer as opposed to well-packaged pallets. This defines how activities on behalf of individual companies affect the overall work of the company—and how costs differ by an individual customer's requirements.

Thus, the data-collection terminals used by Major at the dock produce time-stamped records, as the goods associated with a particular waybill move through a breakbulk facility. Roadway analyzes this data, along with studies of the time required to perform each activity that must be completed to move a shipment across the nation.

Perhaps the most crucial activities revolve around movement across the dock—unloading a trailer, sorting shipments and loading onto outbound trucks. While Roadway would not disclose the individual costs of each of these activities, its operating expenses as a percentage of sales—now at 97.9%—means it still needs to do a better job. Otherwise, its revenue for each shipment will be eaten up by dock costs, transportation and administrative overhead.

Take the cost difference between freight shipped on skids that can be moved with a forklift, rather than as loose cartons that have to be handled individually. The freight handling-cost difference is typically 25% to 35%, although in extreme cases (say, loose shoe boxes) it could be much more.

The cost of the activity starts with direct labor—the number of dock workers involved and the time it takes them, factored against their salary and benefits. But that's only the beginning. Understanding the true cost of the forklift method means weighing the time savings for using the equipment against overhead costs like depreciation and maintenance. This aspect of figuring the cost of activities guards against false economies, where a savings in one area may be outweighed by an expense elsewhere.

Although Roadway encourages its customers to organize their shipments better when they load a trailer, Obee says many of the computerized logistics systems in use today are primed for reducing the expense of picking products from within a shipper's warehouse—which tends to scramble the order in which they're loaded on a trailer. So Roadway also has worked to identify shippers for which this is an issue and change its procedures for unloading their trailers.

One response: A worker inside a trailer rolls bar-coded cartons down a conveyor belt to a second worker on the dock, who sorts them. While the final cost savings from this procedure only boils down to 1.5% to 2% of revenue on one of those shipments, "in our business, that can mean the difference between being profitable or not," Obee says.

Dock transfer costs for a $200 shipment of many small cartons would be roughly $80 in this example, assuming an average of 2.5 dock transfers. Saving time on the initial unloading at the terminal closest to the origin of that shipment could shave the cost to perhaps $77.

FOLLOW THE LEADER

IN THE LESS-THAN-TRUCKLOAD BUSINESS, where labor makes up about two-thirds of total costs, the industry leaders all have adopted some form of activity-based costing. "You could categorize a fair amount of the general processes we use to understand our cost-per-ton, per-shipment, as ABC," says Mike Smid, an executive vice president at Yellow Freight. "Our ability to do well over the last 18 months has a lot to do with our ability to make more costs variable." For example, the Overland Park, Kan., company has manpower planning tools to help forecast workloads and overtime. "The timing of labor in relation to freight flow is the key to optimizing," says Smid.

Arkansas Best declined to be interviewed about its own cost strategies. But its costing model "is 23 years old, and it has been an extremely valuable tool for pricing effectively for new and existing customers," analyst Moore

PROJECT PLANNER
WHAT ARE THE COSTS OF AN ACTIVITY-BASED COSTING PROGRAM? TAKE A LOOK AT THIS **BASELINE** FOLDOUT.

GOTCHA! ACTIVITY COSTING

Did you know that:

? Overambitious efforts to gather data on activities in your operations will suffer diminishing returns

Some activities can be easily metered, such as the automatically clocked time-per-call measures of a call center. But many need to be estimated, either by surveying employees on how much time they think they spend on different tasks or by conducting more scientific time-and-motion studies. While Roadway works hard to get the numbers right, for example, "we do accept that there are approximations in almost everything we do," says Chief Information Officer Robert Obee.

One big challenge is figuring out which activities are truly important and just how precise measurement should be.

Electronic components manufacturer Reptron has some customers whose products require the placing of components by hand, rather than by machines. They are charged for the labor but not the overhead of machinery they don't require.

But determining how much labor cost for Reptron's engineering staff should be assigned to each customer is fairly informal—based on periodic estimates from the engineers, rather than time cards. "Sometimes the cost of collecting data and measuring it outweighs the benefit you might derive," warns Tom Mackedon, controller for manufacturing operations at Reptron.

? Replicating department boundaries or general ledger categories misses the point

You don't want your activity analysis to tell you how much the shipping department spent on maintenance.

Instead, you want to get at activities like "repair conveyor belt"—specific actions from specific parts of your business. You should be able to look at activities that might cross customer service and distribution to get at activities like "fulfill customer order."

That takes cooperation. Gene E. Obrock, vice president of operations at Henkel Consumer Adhesives, admits his company failed on the first try. Formerly known as Manco, Henkel is the maker of Duck Tape brand duct tape.

Managers who were stuck on "the way we've always done it" expected all the change to happen in other departments. The project started over again after about a month. By convincing participants to focus on activities that affected the entire organization, Henkel successfully identified the cost of serving different retailers.

? The data and the way it is analyzed are likely to be politically charged

Gary Cokins, director of industry relations for SAS Performance Management (formerly ABC Technologies), recalls being thrown out of a large commercial bakery when he was working as a consultant for EDS. He ran afoul of the sweet-rolls manager.

The bakery was assigning overhead costs based on the direct hours of labor for producing each product. But the activity-based costing (ABC) analysis changed that picture, particularly in sweet rolls. "We discovered his product was causing more machine breakdowns," Cokins says. "Going in, his product was the most profitable, but by us being able to distinguish which ones were responsible for the most maintenance, the overhead costs were being piled up more and more in his area." The sweet-rolls manager responded by convincing his boss to dump the ABC project and replace it with a quality-management program that would be less of a threat.

? Projects that drag on too long are more likely to fail

Here, the danger is that benefits may not be obvious until managers see how their numbers look. "The death knell is when management changes," says Barbara Roudebush, a product strategy manager at PeopleSoft.

That's when projects that are taking too long to identify activities and their costs tend to be killed off, she says.

Raj Aggarwal, a Henkel board member, says vendors and consultants initially pushed plans that were too expensive and too ambitious. "It took a while for us to sit down with them and say, 'Look, we don't want a gold-plated system,'" he says.

Henkel made activity-costing part of a move to a broader enterprise planning system. That held down the technology investment and produced some early results that could be built on through further refinements to the costing model. —D.C.

says. "Consolidated, on the other hand, was many years late in developing a costing model and really just started it."

Vendors including SAP and PeopleSoft support ABC analysis as a feature of their enterprise planning suites. Oros, a product created by ABC Technologies, now part of SAS Institute, is the leading stand-alone ABC analysis tool (see "The Few, The Proud," p. 42). But at the partial-load trucking companies, including Roadway, much of the ABC infrastructure is homegrown, leveraging the talents of in-house programmers and database architects.

A key tenet of activity-based costing is that assigning indirect costs is as important as measuring direct costs—and that arbitrary allocations produce misleading results. Rather than allocating an administrative function such as human resources to a department based on the headcount, for example, ABC would look at which departments really put the greatest demands on the personnel office. Ultimately, direct and indirect costs are consolidated into an ABC model that goes beyond departmental boundaries to show the cost of delivering a specific product or service to a specific customer.

At Roadway, the key activities are not just "move shipment across dock" and "load shipment on truck," but also indirect ones such as "settle claims for damaged freight." Instead of spreading the cost of freight claims across all shipments, Roadway works to identify which customers and shipment types are associated with the most claims. In fact, since beginning a concerted effort to reduce freight claims in 1998, Roadway has cut the ratio of claims to revenue by 33%—a savings worth "tens of millions of dollars" a year, according to Obee.

Not only truckers are boosting margins by understanding the costs associated with specific activities or policies. At Henkel Consumer Adhesives, the makers of Duck Tape brand duct tape, ABC techniques helped managers identify customers that cost more to serve because they placed many small orders. That let Henkel adjust prices for small customers and give discounts on larger orders.

"If you don't know your costs, you're going to push products that are going to lose you money when you think they're making you money," says Raj Aggarwal, a member of Henkel's board of directors.

One of the most important applications of Roadway's ABC data has been in pricing. Since Roadway created an Oracle data warehouse for its costing information in 1997, some of the biggest users have been a few dozen pricing analysts who advise the sales force. In the summer of 2001, those analysts took the most useful of the reports they had created, using the Business Objects data analysis tools, and published them to a broader audience. Now instead of coming to the analysts for the data, sales managers and regional operations managers were able to run the reports themselves.

Opening up the data warehouse coincided with an improvement in revenue per ton at Roadway, in contrast to the performance of its rivals. In every quarter of 2001 and the first half of 2002, Roadway improved the yield from its less-than-truckload operations, while most competitors were struggling to sustain their prices. Roadway's revenue-per-ton was up 4% for 2001, and has continued to gain even as competitors have watched prices slip in the face of the economic pressures. In the first quarter of 2002, for example, Roadway eked out a 1.1% improvement while the change

THE FEW, THE PROUD, THE COST-EFFECTIVE

The Marine Corps got its orders in 1999: reduce the cost of running its 16 major bases by $110 million a year, by 2004.

So far, so good. Aided by a computer program that supports activity-based costing (ABC) and management like that used by corporations, the Marines exceeded last year's goal of $41 million by $7 million, or 17%.

But it's not necessarily a cause-and-effect relationship. Stephen Pellegrino, who ran the activity measurement project as a Marine officer and now works on it as a consultant, says it's hard to put a precise number on how much of the savings are due specifically to understanding costs more precisely.

"What it gives you is information, and information only saves you money if you act on it," he says. "When I tell someone that we are saving money by changing a simple rule or way of doing things, they say, 'That's not because of activity-based costing; you could have done that anyway.'"

"But we didn't," he notes.

The project came after Congress reallocated some of the funds used to handle services such as housing, transportation, and security for 37,000 Marines and civilian workers. To maintain an acceptable level of these critical services at bases like Camp Lejeune and Camp Pendleton with the available funds, the Corps needed to cut costs. To do so efficiently, it had to understand the cost of every nonmilitary activity it performed, and then automate the job of collecting this cost data so it could be widely used.

At Marine Corps Base Hawaii, on Oahu, for example, the procedure for preparing housing for new tenants was changed when investigation showed that putting families up in a hotel while their house was being cleaned made the transition expensive.

Now families stay in the houses longer and have proscribed cleanup duties before they vacate. This resulted in annual savings of $142,000 at the Hawaii base. At another base, it turned out that three people were each spending up to 60% of their time checking invoices, paying bills and otherwise managing finances. One person working full time now does it all.

Getting detailed information involved interviewing workers and painstakingly setting out the activities in their jobs, in much the same way a movie director uses story boards. Meanwhile, financial information for each base was extracted from a mainframe in Kansas City and entered by hand into software from vendor ABC Technologies (since purchased by SAS Institute of Cary, N.C).

The Marines had to cut costs in time to bid against private contractors for some services, a competitive move required by Congress. The need for speed helped drive the decision to implement the ABC software simultaneously at 15 locations instead of running a pilot and creating a single standard version.

"We just wanted to get the tools out," says Maj. Rod Brewster, the project's senior technical director. "We had a couple of installations doing activity-based costing and a number of others getting ready to do it, so we bought the software and training for each base and said, 'Go do great things, solve your own problems.'"

Every activity performed at the bases was attributed to one of 37 processes, such as "providing transportation" or "maintaining facilities," and aggregated in a database. The bases can still call their activities what they want, with standardization of labels done at the database level. Cognos Powerplay business intelligence software is applied to this database to provide easy-to-use information on costs ascribed to each of those processes, such as fuel or painting. "From a headquarters level, you can see what big chunks of time are being spent on," says Brewster.

But tracking costs is not without its own cost. Having spent just $3 million for the ABC software and less than $25 million for hardware and labor, the Marines thought they were exempt from the cumbersome acquisition guidelines required for large projects. But once the individual applications began to be incorporated into something resembling a true information systems project, the Naval Audit Service began asking questions.

Now, the Marines have to justify something that's already been implemented. "We are having to go through gobs of acquisition paperwork and bureaucracy to get permission for something we've already done," says Brewster. "Now that we are using the SQL server to integrate the legacy data and pump back out to the installations, they say we have built a financial system."

The Naval Audit Service said it could not comment on ongoing audits. Freedom of Information Act coordinator Wayne Rosewell estimated that the final audit would be published in late October. Pellegrino admits that what seemed like a fairly straightforward project clearly has evolved into something bigger.

"It's not a big [technology] system, it is 16 applications that as we automate and make policy are drifting into a true system environment, with standardized information and content," he says.

But the Marines do not regard retreat as an option. "It's deployed, it's done, what do you want us to do?" says Pellegrino. "We can't pretend we haven't already done this." —E.C.

was -0.6% for ABF, -4.5% for Consolidated, and -2.1% for Yellow Freight. In overall dollars, however, Roadway is still chasing ABF, which got $434.60 per ton in the second quarter to $428.11 for Roadway.

The third-quarter results released as this issue was going to press showed Roadway reaching $432.20 per ton, an increase that effectively offset another decrease in LTL tonnage. During the earnings announcement call, CEO Michael W. Wickham said Roadway will benefit from the collapse of Consolidated Freight, but added that whatever business Roadway picks up "has to be priced better than it was at CF—otherwise, we'll be in the same boat."

Roadway has rethought the way its business has traditionally worked, says Peter F. Swan, a business logistics professor at Pennsylvania State University. "Cutting prices is historically what people did (in trucking) to get more business, but the real key is not necessarily to get more business," Swan says. "The truth is you're better off passing business up if it's not at the right price."

And that, indirectly, can even drive rivals into the ground. Says Cunningham, "We committed to a decline in business in those instances we felt pricing was way too weak. In some cases where Consolidated was the competitor, we were not reluctant to let the business go. We are not going to take on business that doesn't cover variable cost; it makes no sense."

The data warehouse has taken Roadway's cost-consciousness to new levels, but it goes way back in the company's culture. Founded in 1930 to haul tires—once Akron's signature industry—Roadway focused on operating efficiency under cofounder Galen Roush. The Oracle data warehouse used for activity-based costing followed an earlier effort to model costs on the mainframe database used by

PHOTOGRAPH BY DAVID FRAZIER/STONE

Roadway's operational systems. In particular, Roadway focuses its attention on the labor-intensive process of moving freight across its docks, since labor and associated expenses account for about 60% of operating expenses.

Before a trailer is pulled up to a breakbulk dock, managers consult the QuikStrip Trailer-Door Optimizer, an application that analyzes the assortment of shipments on that particular trailer to determine which doors those shipments will be re-sent from.

If an incoming trailer contains a high percentage of shipments bound for, say, New York, it should be parked as close as possible to the outbound trailer to New York. The difference between the best unloading zone and the worst could be an hour or more.

Time is, of course, money, in both labor hours and freight-transit schedules. By sending freight directly to one retail customer's West Coast distribution center instead of to its own nearby terminal, Roadway reduced the ratio of operating expenses to revenue on that account by 15%, saving about $520,000 per year, according to Obee.

The death of Consolidated will provide a near-term boost for Roadway and its fellow survivors. But the big picture is cloudy. The long-haul, less-than-truckload freight business "is in secular decline," says Thom Albrecht, a securities analyst at BB&T Capital Markets.

And unionized carriers like Roadway Express face the greatest challenges. "Consolidated's demise helps the long-haul outlook for a couple of years, but the long-term question remains about what to do with three-day to five-day deliveries," says Albrecht. Companies such as Roadway "cannot usually cut their costs fast enough to keep pace with the revenue decline. Innovative (technology) isn't going to save them from erosion in their core services."

Roadway's latest corporate structure, the Roadway Corp. holding company established in 2001, is meant to spur growth as an acquisition vehicle. Last year, Roadway Corp. purchased the parent company of New Penn, which gave it a stake in the faster-growing market for regional less-than-truckload shipments. But the effective management and pricing of the core long-haul business will remain critical for years to come.

At the time of its 1996 spin-off, Roadway's pricing tools—and the underlying understanding of its activities—still had far to go. At an offsite meeting, Cunningham, chief executive Michael Wickham, and a senior sales executive made the decision to upgrade the costing and pricing systems. "Our goal was to improve the margins on the freight we were handling," says Cunningham.

THE ARCHITECTURE OF ABC

ROADWAY PICKS UP 50,000 to 60,000 shipments per day, which stay in its freight system for an average of four to five days. "For every one of them, 10 or 12 times during transit we recalculate where the shipment should be and where it is," says Obee. "Every time a trailer pulls up to the dock, that's 20 or 30 shipments that have to be recalculated, as we replace projections with actual data. Then we recalculate backward, with a schedule that starts with the customer's delivery requirement, and determine what's the latest each activity could occur and still let us meet that target."

The mainframe database management and transaction processing system for these calculations is Model 204 from Computer Corporation of America. While not as well known as relational database products, or even hierarchical mainframe databases like IBM's Information Management System (IMS), the Model 204 software gives Roadway high performance—on the order of 1,800 transactions per second—at a relatively low cost. Enough processing power might support the same applications with a relational database, but that's not Roadway's style. "We've never been ones to throw hardware at a problem," says Obee.

Applications such as QuikStrip, which is geared toward freight within each distribution center or breakbulk, rely on Informix databases at each location. Important information about trailer arrivals and departures is then transmitted to headquarters over a wide-area network of frame relay circuits. The master schedule of shipments and delivery guarantees is maintained on the mainframe, which runs applications to help operations managers decide whether they need to take action to speed delivery of a shipment. For example, they might assign a trailer to a two-man "sleeper team" of drivers who will take turns driving, rather than use the default pattern of single drivers who change off, pony express-style, at relay stops, or by slower but cheaper rail.

BY IMPROVING FOCUS ON SPECIFIC SHIPMENTS TO SPECIFIC CUSTOMERS, DATA WAREHOUSES GAIN CREDIBILITY.

While Model 204 supports a lot of decision-support applications that help Roadway keep its costs down, it doesn't control the ABC analysis per se.

When Roadway built the data warehouse used for ABC in 1997, it decided to use data analysis tools from Business Objects to help pricing and operations analysts make calculations. Rather than tackle a custom integration of Business Objects with Model 204, Roadway built the warehouse on Oracle database software. By the time CCA came out with a version of its product for data warehousing, Roadway's decision had been made.

So where the applications running on Model 204, or locally at each terminal, help managers make cost-conscious decisions about each day's operations, the Oracle data warehouse allows analysts to sift through many days' worth of shipments and labor costs in search of patterns.

For example, the default freight-flow at Roadway is for each shipment to go through two breakbulks—one near its origin and one near its destination—plus two local terminals on each end. Roadway's analysis shows an average savings of $300 for every trailer that can be directly routed from the first breakbulk to the destination terminal. If a direct route to the customer's site can be justified, that's even better.

By improving the focus on specific shipments to specific customers, the data warehouse gained more and more credibility, says William McGinley, director of pricing systems at Roadway. "An archaic version of this didn't do well

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WHEN DATA IS AS IMPORTANT AS THE FREIGHT ITSELF

Roadway Express carries freight, sure. But almost as important is the data it carries about the loads it carries. Manufacturers have to know whether their shipments have arrived; and retailers have to know when they will arrive.

That's why one of Roadway's most important recent initiatives has been improving the quality of the data it hands off to shippers and freight recipients, right down to the purchase-order number. When all is said and done, Roadway wants to replace shipping papers altogether. The preferred document: the electronic bill of lading (BOL).

Chief Information Officer Robert W. Obee and other Roadway managers are active in the Voluntary Interindustry Commerce Standards Association (VICS), a standards organization focused on the retail supply chain. Roadway and the trade group are pushing a standard format for submitting and exchanging the bills.

A bill of lading traditionally has been created by the sender, providing details of the contents of a shipment, its destination and any special handling requirements. Roadway uses another document, called a waybill, for shipments in transit, and ultimately generates a number of other electronic and paper documents for the shipper and recipient.

But the accuracy of all these other documents depends on getting the document recorded properly and verified.

Right now, more than 95% of BOL documents are still handed to Roadway's driver as a piece of paper. In the best case, the paper bill of lading may be computer printed and bar-coded. But about 30% still come in handwritten.

The difference between handling an electronic bill versus a paper one is about $1 each. That's worth about a half-percentage point in operating margin, given that Roadway's average revenue per shipment is about $200. But the real gains are in accuracy, since the information that comes in electronically avoids the pitfalls of manual data entry.

At the same time, Roadway has attacked the mountain of paper generated by 50,000 to 60,000 shipments per day with technology and training. Its Acquire Shipment Detail system tries to boost accuracy by providing templates of the most frequently shipped items from particular customers so that data entry clerks don't have to keep typing in the details that haven't changed. Data entry personnel must pass regular certification tests and are called "ASD professionals," rather than clerks.

Perhaps the most boring but most important task is to get the original purchase-order number into the electronic document correctly. The purchase-order number acts sort of like an easy-pass certificate, making it possible to quickly clear shipments through different "breakbulk" distribution facilities, trucks and docks at recipients' stores and factories. Here, Roadway's systems try to boost accuracy by making sure the purchase order that's entered matches the standard pattern for a retailer or other recipient. So if the system expects four alphabetic characters, followed by seven digits, it knows to raise a red flag if the pattern doesn't match.

"It may sound trivial, but it's one of the most significant things Roadway does that gives us a competitive advantage over other carriers when dealing with our retailers," Obee says. "One of the things they rate us on is the percentage of the time they receive accurate and timely status updates from us, and we frequently score in the high 90% range. We've been told of examples of competitors who are in the 60% range."

But the biggest error-proofing will come when the original documents are submitted in electronic form to Roadway first. That makes it faster, cheaper and more accurate to process a new shipment. Some retailers have begun to make this a requirement for their vendors, realizing that it affects the quality of the data that ultimately flows into their systems. Federated Department Stores, the parent company of Macy's and Bloomingdale's, is moving in this direction because it found shipments were sitting idle in its distribution centers for lack of accurate information about the merchandise they contained.

Roadway now shows Federated whether a bill of lading was submitted electronically or on paper. This gives Federated the data it needs to enforce the new requirement on suppliers.

At Henkel Consumer Adhesives, a Roadway customer that sells its products through retailers like Wal-Mart and Home Depot, vice president of operations Gene E. Obrock says doing business electronically is in the supplier's interest as well. "It ensures data integrity, speed and accuracy," he says. —D.C.

because people were always challenging the results," McGinley says. But by getting managers on every level involved in figuring out the real costs, most of those objections have gone away, he says. "Before, they might say, 'That's just an average.'" Now, the company can calculate actual costs of specific activities for particular customers, down to the dollar.

A healthy dose of human judgment of how to use that information, though, is still required. McGinley likens the picture delivered by the numbers to a police sketch.

"It may tell you what someone thinks they look like, not what they really look like," he says.

That's one reason he prefers to make reports on costs available to senior sales and operations managers, rather than individual salespeople or terminal managers. "We wouldn't want a terminal manager making the decision to dump a customer," McGinley says. A local manager might see high freight pickup costs for a particular shipper, yet lower costs elsewhere in the freight network might make up for that.

CODING AGAINST THE GRAIN

OBEE'S DEPARTMENT hasn't been immune to budget cuts, but he has tried to confine them to cutting back on consultants and contract workers. Obee needs to keep technical skills in-house because Roadway Express runs almost entirely on software developed by its own programmers, much of it running on the somewhat-exotic Model 204 mainframe software.

This bucks current wisdom that smart project managers buy packaged software from outside vendors, use the vanilla versions and then conform business processes to fit.

Obee questioned the practice of instead creating code internally when he became CIO in 1997. "I told the staff I'm very uncomfortable with this," Obee says. "Are we doing the right thing? But I've drawn the conclusion, firmly, that we are doing the right thing."

One way Roadway departs from the normal conventions of business is that it treats every shipment as having not one

customer, but two. Only one customer per shipment pays, but both shipper and recipient have expectations and sometimes service guarantees that must be tracked.

For example, even when a shipment to a retailer is paid for by a manufacturer, Roadway must satisfy the recipient retailer's requirements in order to stay on its list of preferred carriers. Getting dropped from Wal-Mart's preferred carriers list would hurt, because Wal-Mart penalizes vendors who ship via carriers that aren't on it.

Roadway also made unusual technical choices in Web development. The my.roadway.com customer site is driven by Model 204, using the Janus Web Server add-on from Sirius Software. Model 204 User Language programming statements drive the generation of eXtensible Markup Language code, which is then reformatted into HTML for different audiences on an Apache-based proxy server running on IBM's AIX version of the Unix operating system.

One of the main benefits of this architecture is that it allows Roadway's developers to reconfigure existing applications for Web access and to work with a programming language they already know, rather than having to learn Java or Active Server Pages programming.

Using the same offbeat approach, Roadway is converting its own Model 204 applications, most of which currently have green-screen terminal interfaces, into graphical Web versions.

Daryl Korsmeyer, corporate transportation manager at industrial ceramics maker CoorsTek Inc. cites information technology as one of the reasons he chose Roadway to be his primary partial-load carrier.

"We were looking for the technology a carrier can provide," Korsmeyer says. He was impressed by the way dock-workers knew where a shipment was within a trailer, information that lets Roadway ensure that shipments continuing in a trailer after a stop are positioned in the nose of the trailer, while others that need to be unloaded promptly are placed in the rear.

That's what Roadway is looking for when it analyzes its costs, together with other operational data. The real win is lowering costs while improving service and relationships with customers.

BACK AT THE LOADING DOCK

AT THE COPLEY BREAKBULK, Major opens another trailer. The data-collection terminal by the dock door prompts him to answer a quick, eight-question survey: Was the trailer loaded high and tight? Were heavy objects braced properly? and so on. It's an annoyance, but he's lobbied the programmers to cut back on the number of questions they have the system ask, so it won't slow him down too much. The answers may help Roadway become just a little bit more efficient. But Major has his own priorities. Not having to get his pencil out is, to him, a significant advance.

After all, when winter rolls around, there will come the zero-degree nights when the wind whistles through the cracks between the dock doors and the backs of the trailers. Then, he won't just be identifying his activities when he punches in codes. Yes, he'll keep helping Roadway save money, by showing how his work affects its costs. But he'll be saving his fingers as well.

"I won't have to take my mittens off," he says.

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BASE TECHNOLOGIES

Roadway combines **outside terminals** and **wireless technology** with lots of **homegrown code** running on a variety of database and transaction engines. It does this to **closely track** what it believes are the unique requirements of its **partial-load trucking business.**

APPLICATION, SERVICE	PRODUCT USED	SUPPLIER
Dock-door data-collection terminals	Wall-mounted terminals with bar-code scanners (CMI Model 1449 and later releases), working with custom applications on AIX	Hardware Control Module Inc., Roadway in-house development
Digital Wireless dispatching	OmniTRACS	Qualcomm Wireless Business Solutions
LTL pickup and delivery scheduling, route optimization	Custom code	In-house
Data synchronization	Custom messaging middleware, with a store-and-forward architecture	In-house
DATABASE/TRANSACTION PROCESSING		
Central database and transaction engine	Model 204	Computer Corporation of America
Distribution center operations	Informix 7	IBM
DATA WAREHOUSING & ANALYSIS		
Data warehouse	Oracle 8	Oracle Corp.
Analytic tool	Business Objects 5.1	Business Objects
WEB SITE		
Web application server	Janus Web Server	Sirius Software
Proxy server	Combination of Apache Web server on IBM AIX with custom code	Apache Software Foundation, IBM, In-house

FINANCIAL SYSTEMS

With the exception of an accounts-payable package from AXS-One (formerly Computron), Roadway continues to write most of its own code. The activity-based costing application employs the data warehouse described above (Oracle and Business Objects), not a packaged ABC software product.

OPERATING SYSTEMS

Most enterprise systems run on IBM's OS/390 mainframe operating system. The Oracle data warehouse and the distributed databases at each terminal and breakbulk employ AIX (IBM's Unix).

SOURCES: ROADWAY CORP., *BASELINE*